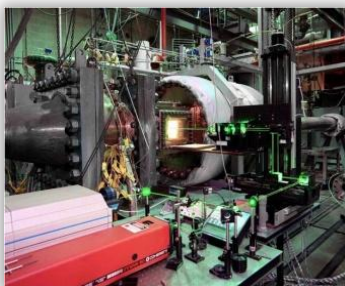


High Pressure Combustion Research Facility (HPCRF)



Description:

This facility is used to develop and evaluate advanced gas turbine engine combustor and augmentor concepts, laser-based diagnostics, and computer models. The facility provides the infrastructure to test small full-annular, full-scale, advanced augmentors as well as multi-cup combustor sectors. A wide variety of instrumentation is available to measure pressures, temperatures, flow rates, fluid velocity, exhaust gas species, particulate matter, transport and evaporation phenomena, fuel injection spray characteristics, and kinetics. Phase Doppler Anemometry for spray characterization, Laser Induced Fluorescence for temperature, species concentrations and for imaging flows and time-division-multiplexed hyperspectral absorptions spectroscopy for temperature are part of the available instrumentation to enable non-intrusive measurement of these combustion parameters. Optical access and embedded camera visualizations further compliment the facility.

Research rigs vary in size from single cup combustor flame tubes, combustor and augmentor planar and arc sectors utilizing aircraft hardware, to full annular small engine combustor and augmentor systems. The facility is adaptable for advanced research applications replicating aircraft cycle conditions and possessing many characteristics of aviation gas turbine systems burning a wide variety of alternative, gaseous and liquid fuels from ambient to superheated delivery temperatures. Air flow rates, temperatures, and pressures are available up to 34 lbm/s, 1100 F, and 0.25-40 atm, respectively.

Purpose:

Perform basic research in combustion sciences and exploratory development of combustor and augmentor concepts for turbine engine and advanced air breathing propulsion systems. Provide bench mark quality data to develop and validate combustion models and diagnostic techniques and use these tools to understand fundamental combustion processes. Aid engine companies in developing high-performance, low-emissions combustors for air breathing propulsion systems.

Products:

- Trapped Vortex Combustion (TVC) technology
- Inter-Turbine Burner (ITB) demonstration
- Ultra Compact Combustors (UCC)
- Small engine full-scale full-annular augmentor technology development
- Large engine full-scale sector technology development
- Prototype pulsed detonation engine technology
- NI Labview data acquisition custom engineering platform

Availability:

Primarily in-house and related DoD contractor research. Other U.S. Government agency, DoD contractor and commercial customer programs upon request. Contact: 937-656-7280.